WE CLAIM:

1. A method of measurement using an optical measurement instrument in a coal bed methane well with a borehole extending to at least a top surface of at least one coal bed and containing water, comprising:

providing a housing including a radiation source, a detector and a sample interface,

lowering the housing in the well to a depth down the well,

positioning the sample interface to a sample, the sample being a face of the coal bed,

irradiating the sample from the radiation source,

detecting a characteristic radiation of the methane from the sample with the detector, the characteristic radiation first passing through an optical spectral filter, and

processing a signal from the detector to calculate a concentration of the methane.

2. A method of measurement in at least one coal bed methane well, comprising:

providing an instrument package in a housing,

lowering the package to a depth down the well,

removing the methane from a local region of a coal face,

positioning a radiation source to irradiate the coal face and a detector to detect a characteristic radiation from the coal face,

irradiating the coal face with radiation from the radiation source to produce the characteristic radiation from the coal face, and

measuring a concentration of methane or other evolved substances over time on the coal face by detecting the characteristic radiation from the coal face with the detector, transmitting a signal from the detector to a signal processor and processing the signal to calculate the concentration of the methane

or other evolved substances on the coal face in order to observe a repopulation of the coal face with the methane or other evolved substances.

3. A method of measurement using an optical measurement instrument in a coal bed methane well with a borehole extending to at least a top surface of at least one coal bed and containing water, comprising:

providing a housing including a radiation source, a detector and a sample interface,

lowering the housing in the well to a depth down the well,

positioning the sample interface to a sample,

preconditioning the sample,

irradiating the sample from the radiation source,

detecting a characteristic radiation of the methane from the sample with the detector, and

processing a signal from the detector to calculate a concentration of the methane.

4. A method of measurement according to claim 3, wherein the sample is a face of the coal bed, and the preconditioning is perturbing a local pressure of the sample.

5. A method of measurement according to claim 3, wherein the preconditioning is preconcentrating the methane by perturbing local pressure via heating, sound waves or water pressure changes.

6. A method of measurement according to claim 5, wherein the sample is a coal face.

7. A method of measuring methane using an optical instrument in a coal bed methane well with a borehole extending to at least a top surface of at least one coal bed and containing water, comprising:

providing a housing including a radiation source, a detector and a sample interface,

lowering the housing in the well to a depth down the well,

positioning the sample interface to a sample,

irradiating the sample from the radiation source,

detecting a characteristic radiation of the methane from the sample with the detector, the sample being a coal face, and

processing a signal from the detector to calculate a concentration of the methane to determine whether the coal face is saturated, unsaturated or partially saturated

8. A method of measuring according to claim 7, wherein the saturation of the coal face is used to predict an amount of water or a rate of water to be removed during production of methane from the well.

9. A method of measurement using an optical instrument in a coal bed methane well with a borehole extending to at least a top surface of at least one coal bed and containing water, comprising:

providing a housing including a radiation source, a detector and a sample interface,

lowering the housing in the well to a depth down the well,

introducing a fluid into the coal bed and extracting the fluid,

positioning the sample interface to a sample contained in the fluid,

irradiating the sample from the radiation source,

detecting a characteristic radiation of the sample with the detector, and

processing a signal from the detector to calculate a concentration of the sample.

10. A method of measurement according to claim 9, wherein the fluid contains a spectrophotometric marker that reacts with methane, coal or other analytes.

11. A method of measuring methane using an optical instrument in a coal bed methane well with a borehole extending to at least a top surface of at least one coal bed and containing water, comprising:

providing a housing including a radiation source, a detector and a sample interface,

lowering the housing in the well to a depth down the well,

positioning the sample interface to a sample wherein the sensitivity and accuracy of the positioning are reduced via one of varying a focal length of the optical instrument electronically, varying a focal point mechanically, using an internal standard for the optical instrument and col_____ing the radiation source,

irradiating the sample from the radiation source,

detecting a characteristic radiation of the methane from the sample with the detector, and

processing a signal from the detector to calculate a concentration of the methane.

12. A method of measurement using an optical instrument in a coal bed methane well with a borehole extending to at least a top surface of at least one coal bed and containing water, comprising:

providing a housing including a radiation source, a detector and a sample interface,

lowering the housing in the well to a depth down the well,

penetrating a coal face via pressing a protuberance against the coal face in order to expose a sample,

positioning the sample interface to the sample,

irradiating the sample from the radiation source,

detecting a characteristic radiation of the methane from the sample with the detector, and

processing a signal from the detector to calculate a concentration of the methane.

13. A method of measurement according to claim 12, wherein the protuberance includes a collection and/or excitation lens for the optical instrument.

14. A measuring system for introduction into a well, comprising:

a housing being traversable up and down the well,

a guide extending down the well from a fixed location and being operatively connected to the housing,

an optical instrument being located inside the housing and including a radiation source, a sample interface to transmit a radiation from the radiation source to a sample, and a detector to detect a characteristic radiation emitted, reflected or scattered from the sample and to output a signal,

a signal processor to process the signal from the detector and calculate a concentration of a substance in the sample, and

an ultrasound device arranged in or on the housing to produce ultrasound waves.

15. A measuring system according to claim 14, wherein the ultrasound device is positioned to clean optical windows of the housing or optical instrument.

16. A measuring system according to claim 14, wherein the ultrasound device is positioned to clean a coal face of the well.

17. A measuring system according to claim 14, wherein the ultrasound device is positioned to direct the sound waves at a coal face in order to desorb methane from the coal.